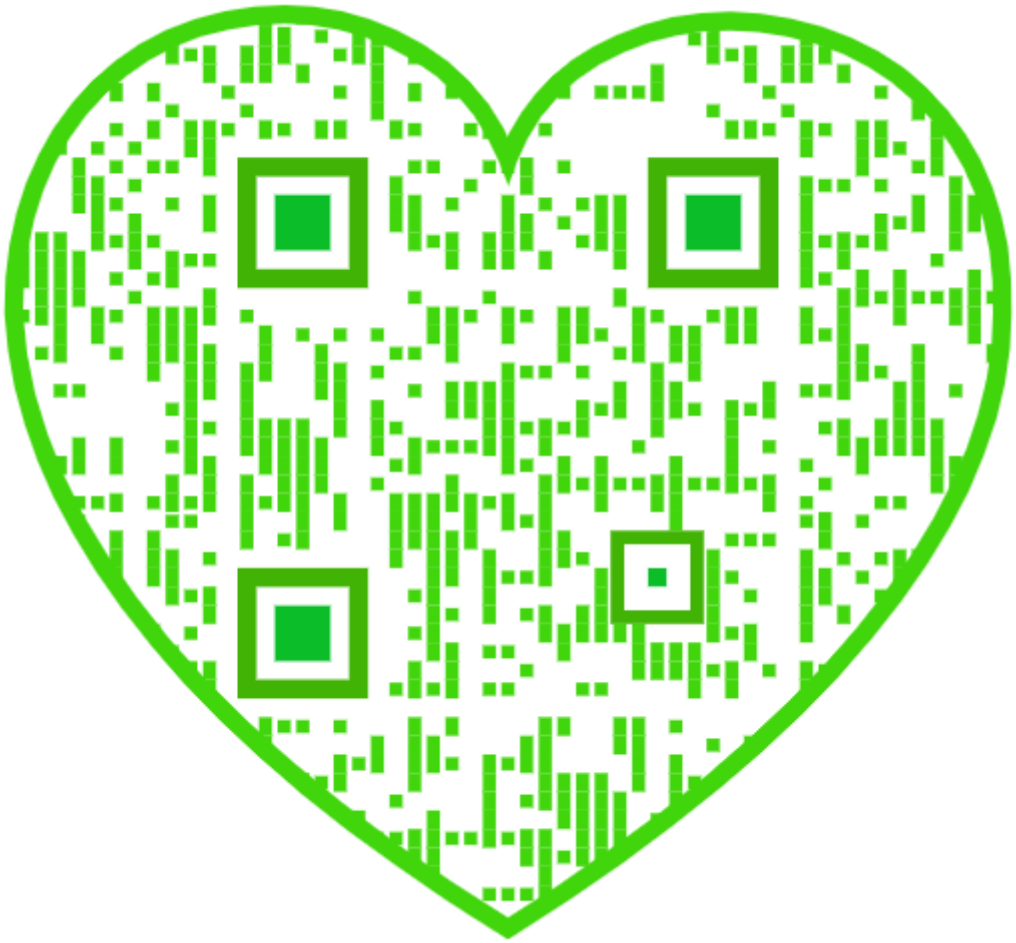

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U. S. Department of Agriculture,
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SECOND EDITION OF

Mushrooms and Mushroom Spawns

AND GUIDE TO

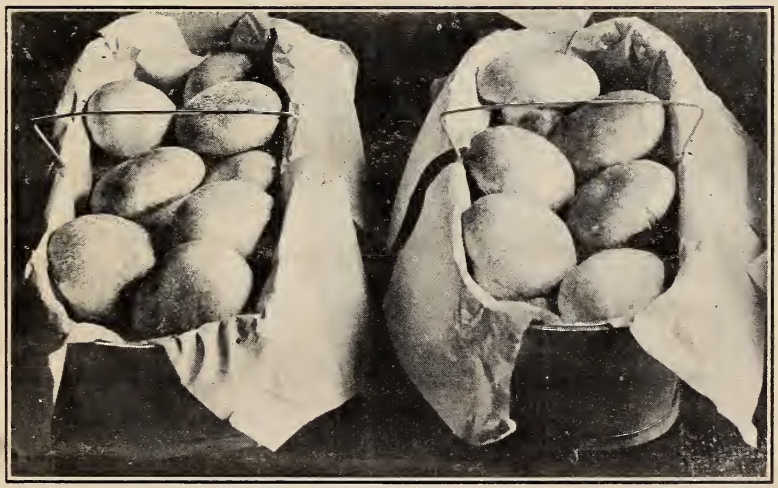
Mushroom Culture.

ISSUED BY THE

PURE CULTURE SPAWN CO.

Meramec Highlands, St. Louis Co., Mo.

Originators of Improved Varieties of Cultivated Mushrooms.



GROWN FROM "TISSUE-CULTURE PURE SPAWN."

ED. R. KINKEAD, PRINTER, KIRKWOOD, MO.

A. M. FERGUSON,
President.

C. H. WINKLER,
Manager.

Pure Culture Spawn
..... Company .....

MERAMEC HIGHLANDS, MO.
(Formerly of Columbia, Mo.)

Growers of Mushrooms and Pure Culture Mushroom Spawn.

Twelve Mushrooms, Weight 4 Pounds. Grown From "Tissue-Culture Pure Spawn," by Mr. J. B. Swayne, Kennett, Pa.

A Year's Progress.

Early in 1904 the work of the Pure Culture Spawn Company was projected. For some time previous a member of the company had been engaged in carrying out a series of experiments on mushroom growing and in testing all the known brands of mushroom spawn produced in England, France and America. This test also included a spawn produced by an entirely new and original process, which will be described later on. The important features of this spawn were in the quick growth, large mushrooms, and a yield that was three times greater than for any other spawn. The importance of such results was fully recognized, but the difficulty of producng this spawn cheaply seemed hard to overcome. It has been overcome in part, however.

After many trials and experiments, in which we were aided by trained physiological botanists, we succeeded, and the new spawn was placed on the market as

"TISSUE-CULTURE PURE SPAWN."

This name tells just what it is. Absolutely pure cultures of mushroom spawn grown from the tissue of selected mushrooms. It required the knowledge of a mushroom grower; the skill of a spawn producer and the training of a bacteriologist and a plant physiologist. All that cost money, you say. Yes, but "Tissue Culture Pure Spawn"

WON FAVOR WITH THE GROWERS.

It is sufficent to say just here, that our efforts to produce a reliable grade of mushroom spawn—a spawn that will grow quickly and produce more and better mushrooms—won the commendation of the growers in all parts of the country. Orders were so far beyond our expectations that all spawn was soon sold and much delay was experienced in filling the late orders.

Our New Plant. In order to get facilities to manufacture sufficient spawn to meet the demand we removed from Columbia to Meramec Highlands, St. Louis County, Mo. We expect to be able to fill all orders promptly hereafter. However, in order that we may be able to fill orders without haste or undue delay, it would be well to place orders in advance of the time when the spawn will be needed. Fresh spawn is much better than old spawn. For this reason we do not grow spawn in quantities larger than we think will be necessary to supply the current orders.

Investigations in Mushroom Culture. The U. S. Department of Agriculture has been conducting a variety of investigations relating to the Mushroom industry at home and abroad. Some of the results of these investigations have been summarized in a popular bulletin.* Every person who has a vacant cellar, basement, cave or greenhouse should secure the bulletin on "The Cultivation of Mushrooms," by Dr. B. M. Duggar, Professor of Botany, University of Missouri.

DR. GALLOWAY ON "NEW METHODS IN MUSHROOM GROWING."

Dr. B. T. Galloway, Chief Bureau of Plant Industry, U. S. Department of Agriculture, published an article in the "Florists Exchange," July 16, 1904. We extract the following:

"NEW METHODS IN MUSHROOM GROWING."

BY B. T. GALLOWAY.

"I recently had an opportunity of examining the methods of preparing for the market pure mushroom spawn by A. M. Ferguson at Columbia, Mo. * * * * *

"Practically all of our mushroom spawn is imported, and while much of this is good, there is always a great deal of uncertainty as to the origin of the spawn, especially as it has never been grown or developed under anything like systematic, scientific methods. It is always the desire to secure what is known as Virgin Spawn to start with; that is, spawn that has not previously been exhausted by bearing mushrooms. Such spawn is difficult to obtain, and, as a matter of fact, is secured only to a limited extent in the ordinary manufacture of the English brick material. Dr. Duggar's work has shown how to grow spawn direct from spores by a stimulating process, thus making it practicable to adopt systematic selection, as the type of mushroom can be determined upon before taking the spores.

"While this work is still in course of developement, another

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* The Cultivation of Mushrooms (Farmers' Bulletin No. 204). Sent free to all who apply to the Secretary of Agriculture, Washington, D. C.

interesting line of investigation, inaugurated by Dr. Duggar, and now being put into practical operation by Mr. Ferguson, is the growing of spawn from the tissue of the type mushrooms themselves. The process is simple. An ideal type of mushroom is selected, and from it a bit of the tissue is taken and grown in sterilized media in such a way that all other organisms, including bacteria and fungi, are eliminated. Thus is obtained pure spawn or mycelium from a source which is known to be reliable and from a particular mushroom which will give as its progeny mushrooms of exactly the same kind.

"Mr. Ferguson has so perfected his methods and system that he will be able to trace the origin of every lot of spawn that he sends out. In order to be in position to make proper selections, Mr. Ferguson is also preparing to grow mushrooms on a somewhat extensive scale. He is doing this more for the purpose of having stock from which to secure spawn than for the mere purpose of growing mushrooms for market.

"The work as above described is being conducted at the Experiment station, University of Missouri, Columbia, where most of the laboratory investigations of Dr. Duggar and Mr. Ferguson have been carried on. The careful methods followed by Mr. Ferguson will undoubtedly enable him to furnish a spawn that will not only be true to type, but will be active and ready for growth as soon as placed in the beds."

The Virgin Spawn Problem. The mushroom indusdry is several centuries old. Long before they were cultivated the "Field Mushroom" [*Agaricus* (*Psalliota*) *campestris*) was esteemed as a table delicacy. It does not seem to be known just when or by whom they were first cultivated. Probably it occured to some gardner genius to take spawn from the fields and introduce it into specially prepared beds of composts. This has been the practice up to the present. It has long been known that spawn that has produced a crop, or "Spent Spawn," does not grow with as much vigor or produce near so plentifully as spawn that has not produced a crop of mushrooms, or "Virgin Spawn." Although the mushroom produces an abundance of *spores* on the under side of the cap, until recently no one knew how to germinate them.* Even under natural conditions they germinate but rarely. The spores that have germinated naturally have been the sole source of "Virgin Spawn." Virgin spawn is secured at many hazards, however. In the field it looks just like the spent spawn, and the worthlessness of spawn secured in this way can not be known until tried, and this, with the further difficulty that it was not possible to perpetu-

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* See Bulletin No. 16 U. S. Department of Agriculture, by Miss Margaret Ferguson.—"A Preliminary Study of the Germination of the Spores of Agaricus campestris and other Basidiomycetes Fungi."

Fifty cents to one dollar per pound are the prevailing prices paid for first-class mushrooms as shown by the market reports. If you get less it's because your mushrooms are low grade. See illustration on inside front cover.

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ate a desirable variety when found, forced mushroom spawn growers to go to the pastures each season for new spawn. This was nothing but

Wild Mushroom Spawn. It seems remarkable that these wild mushrooms have been cultivated so long and so extensively in some quarters, without some one discovering a method of perpetuating superior varieties when found, to say nothing of a possible gradual improvement such as has been done for other cultivated plants.

In 1901 more than nine and one-half millions (9,680,000) pounds of mushrooms passed through the Central Market of Paris alone—to say nothing of the quantity marketed through other channels—all produced by the cultivation of "wild" spawn! Yes, and it may not be without interest to know that over four million pounds of canned mushrooms are imported by the United States.

The Beginning of Progress. With the aid of our pure culture methods we are able to secure all the advantages of a Virgin spawn without risk or uncertainty, and in addition know what we are growing. We propagate superior varieties true to name, just as your nurseryman propagates desirable varieties of apples, plums, etc. From these facts every gardner understands why

THE SUPERIORITY OF "TISSUE-CULTURE PURE SPAWN"

has been established so quickly. It is due simply to this: We grow spawn only from varieties giving large yields of good, marketable mushrooms.

Pedigreed Spawn. Yes, we are the originators. There is nothing gained by pedigree simply. We want *good* pedigrees. We are constantly testing such varieties of mushrooms as have a promise of value. Each variety is given a score according to the qualities possessed.

Mushroom Score Card. Each form tested is given a score. We want to know the productiveness of the strain; the productiveness of the bed from which the selections are made; the length of the "running" period; the length of the bearing period; the size, shape, flavor, etc., of the individual mushrooms, due regard being given to texture, color, and other special points affecting its value for cultivation as a commercial crop.

Get out of the ruts! It doesn't cost a cent more to grow good mushrooms from good spawn, It does make much difference in the returns.

You should not be content with less than one pound of mushrooms per square foot of bed. Some people get two with "TISSUE-CULTURE PURE SPAWN."

The Superiority of "Tissue-Culture Pure Spawn" is made possible by our improved methods in making pure cultures, and careful and systematic selection.

It has these merits:

1. All the advantages of a Virgin Spawn.
2. Improved varieties—varieties giving greater yields and better mushrooms—varieties that have a *habit* of doing these things.
3. Pure strains of distinct sorts. No "chance" sorts of uncertain value.
4. It grows. It's alive. We send out nothing but fresh spawn.
5. It has our trade name—"T.-C. P. SPAWN."

Improved Varieties. We are pioneers in applying the principle of *selection* to spawn growing. We are the originators of pure and superior varieties of cultivated mushrooms. We now offer spawn of four select varieties. A number of other forms are being tested. These varieties represent careful selections from different strains of mushrooms and have been thoroughly tested.

VARIETIES OF THE FIELD MUSHROOM.

(*Agaricus campestris.*)

BOHEMIA—Brown cap with very firm, thick meat; forms large, well-shaped buttons; excellent flavor and a good shipper.

COLUMBIA—Very large, velvety cap; almost pure white; firm, fine flavor and very attractive.

ALASKA—Smooth white cap; above medium size. Resembles Bohemia but thinner fleshed. Usually comes into bearing a little later than the other varieties.

VARIETIES OF ———— MUSHROOM.

(*Agaricus villaticus.*)

GALLOWAY—Large mushroom, almost white, firm flesh, thick stem and fine flavor. Forms very large, regular buttons. A heavy cropper. Spawn ready about September 15.

VARIETIES OF THE ALMOND FLAVORED MUSHROOM.

(*Agaricus fabaceus.*)

We now have two promising forms of this species under test which will very probably be introduced next season.

Uncle Sam's experts would tell you that we have a genuinely "improved" spawn. So will we, but there is this difference: They haven't any spawn for sale and won't look you up to tell you. We do and our success depends on getting the growers to know what we have. Our words are no better than theirs, however.

Orders. Send in your orders well in advance. Don't wait until your beds are ready to receive the spawn. Shipments are sometimes delayed in transit. We do not keep large quantities of spawn on hand. It is to our interest to supply you with *fresh* spawn. It is to your interest to *use nothing but fresh spawn.*

If your seedsman does not handle "Tissue-Culture Pure Spawn" send to our agents in your territory or direct to us. For list of agents see pink sheet.

Remittances should be sent by post office or express Money Order, certified check, New York or St. Louis draft. Stamps may be used for orders amounting to less than one dollar.

"Tissue-Culture Pure Spawn" comes in cakes or bricks of a specially prepared compost that gives the greatest amount of active spawn per cubic inch of cake. The new cakes are rectangular 9x5x1¾ inches, light, clean, and do not contain a surplus of loam. In spawning the bed we recommend that the cake be broken into about twelve to fifteen pieces and the latter be placed eight to ten inches apart in the bed. Each cake will spawn eight to ten square feet of bed.

100 Cakes, or more_____$15.00 per hundred.
50 " " " _____ 0.18c per cake.
25 " " " _____ 0.20c " "
5 " " " _____ 0.25c " "
One Cake or more sent prepaid, 35 cents each.

NOTE.—The cakes weigh about one and one half pounds, so that the price per hundred pounds is approximately $10.00.

Correspondence. All orders are acknowledged upon arrival, and shipments follow as soon as conditions permit. When shipping directions are not given we use our own judgement as to carrier, routing, etc.

Upon arrival of spawn it should be examined and if not satisfactory, notify us immediately. We exercise great care to avoid mistakes. When they do occur, do us the kindness to call our attention to all the facts. Write us goodnaturedly if you can. If you can't, write anyway.

Upon Arrival of Spawn, if not to be used immediately, store in a cool place. It will keep for several months when properly stored.

Growing Mushrooms.

We receive many letters inquiring for information about growing mushrooms. To obviate the necessity of writing to each customer we give here concise practical directions for growing mushrooms. The U. S. Department of Agriculture has recently published a bulletin on "The Cultivation of Mushrooms" which will be sent free to all who apply to the Secretary of Agriculture, Washington, D. C.*

We will take pleasure in answering any special questions about the cultivated mushrooms.

Success in Growing Mushrooms is not so much dependant upon long experience as an intelligent study of the conditions. There are three important things to consider:

1. The spawn.
2. The manure and its composting.
3. The temperature of the place in which the beds are made.

Mushroom Spawn as sold by the seed trade consists of a quantity of some sort of compost supporting the delicate white threads of the mushroom, called *spawn* by gardners, and *mycelium* by botanists. The natural home of mushroom spawn is in the soil of the meadow or the compost of the barn-yard. It is a part of the mushroom plant and is used to spawn or seed the beds on which one desires to grow mushrooms. Propagating mushrooms by means of spawn is analagous to propagating potatoes by the 'eyes,' or radishes by seed. The kind of mushroom produced will be determined by the kind of spawn used. There are many varietes found in nature. Some are suitable for cultivation. Many are worthless for cultivation. It is the business of the spawn producer to select the better sorts for propagation.

The spawns now on the market, and from which the mushroom grower must choose, are

1. English brick spawn which has been used by nine-tenths of the American growers for many years. This may be secured from any seedsman. As explained on page 3 of this circular, this is nothing but a good quality of "wild" spawn and is usually described in the

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* Farmers' Bulletin No. 204. Also, Bulletin No. 227, "Growing Mushrooms for Amateurs," Cornell University Agriculture Experiment Station, Ithica, N. Y.

Yes, you can do as well in that basement of yours, or under those greenhouse benches—if you use the right kind of spawn.

Uncle Sam's experts on mushrooms say we've got "good goods." You don't have to take our word unless you want to. Ask them about us or our spawn.

catalogs as "best English spawn." Unless it is fresh it does not grow.

2. French Flake Spawn. The larger seed houses usually keep this spawn on hand, but it has given very uncertain results.

3. "Tissue-Culture Pure Spawn" is the trade name for the spawn grown by the Pure Culture Spawn Co. The advantages of this spawn are fully described in the first part of this circular. It is put up in cakes 9x5x1¼ inches.

Spawn does not keep indefinitely, but deteriorates with age just as seeds, only the injury is more pronounced. It gives best results when fresh, and is likely to be worthless if more than six or eight months old. Heretofore American growers have been forced to use foreign grown spawn and the long ocean voyage prevented them from getting a fresh spawn. It is often kept on hand by the seedsmen for a considerable time, who, ignorant of its rapid deterioration, sends it to his customers. Nine-tenths of the failures in mushroom growing result from the use of old spawn, or spawn that has been improperly stored.

NOTE.—Store spawn in a cool place free of any access of moisture. Cold, even freezing, does not injure it. Its vitality is soon destroyed by storing in warm warehouses.

SELECTING A PLACE TO GROW MUSHROOMS.

For successful mushroom growing a temperature of 50 to 60 degrees Fahrenheit is absolutely necessary during the fruiting period. Higher temperatures are not objectionable for the first few weeks after spawning. Places that are seepy, or, from any cause, have a surplus of stagnant water should never be used. These conditions are easily obtained in basements, cellars, many caves, abandoned mines, and spaces under greenhouse benches. In some cases they are grown in barns, or even in the open.

Dr. B. M. Duggar, who has charge of the Mushroom Investigations of the U. S. Department of Agriculture (Farmers Bulletin No. 204) says:

"Cellars, caves and abandoned mines, or specially constructed houses, are use for growing mushrooms, because in such places only can the conditions of temperature and moisture be best regulated.

It costs no more to grow mushrooms from high yielding spawn—"TISSUE-CULTURE PURE SPAWN"—than the common sorts.

"Information about growing mushrooms?" "Any special information you want?" We have probably answered your questions forty times for others. We would as soon do it for you.

The beds usually begin bearing in five to eight weeks and continue producing from two to five months. For continuous family supply make new beds every three or four months.

Cold is less injurious to mushroom beds than heat. The former renders the bed for a time unproductive; but the latter stimulates the spawn to too rapid growth, which is usually followed by the production of unsalable mushrooms, or by the eventual death of the spawn, supposedly by damping off.

"Mushrooms may often be grown in a very simply constructed shed or unused barn which will provide against any sudden changes of the temperature, and when it is possible to employ artificial heat the season for mushroom production in such structures may be greatly extended. Cellars are very commonly used in producing mushrooms for family use. Natural or artificial caves are of the first importance however, for commercial work, since the situation of these below the surface will best insure a temperature throughout almost the entire year more or less close to that which is desired. In selecting caves or cellars, one should guard against the possibility of flooding or of too much seepage water during a rainy season. Perhaps the least satisfactory situation among those mentioned is the greenhouse. Under ordinary circumstances it heats up too rapidly during days of warm sunshine, and, unless special precautions are taken, it is not to be generally recommended for amateurs. Nevertheless, during the fall and winter it is possible to grow mushrooms under the benches or in any other unused space with but very little outlay of money or labor. Cold frames may also be used to good advantage during the autumn or spring. The natural caves of this country and abandoned coal mines in some sections should be further investigated with relation to their adaptability for the commercial production of mushrooms. A thorough study should also be made of open air conditions.

"In the construction of special mushroom houses any one of a variety of plans may be followed, and the selection of the style will depend, of course, upon its cheapness and efficiency in the particular locality."

PREPARATION OF THE COMPOST.

Mushrooms grow naturally in half decayed manure piles. This is the natural soil of the mushroom. The spawn would be killed by the heat of fermnetation if placed in a bed of fresh manure. It must undergo a preliminary fermentation. The manure, preferably that from

Yes, in a place like yours—that basement or cellar—you can grow a crop of mushrooms in three to five months and make it bring you 25c to $1.00 for every square foot. How many square feet in your basement?

well nourished draft animals with a moderate amount of grain straw or shavings used for bedding (never hay or coarse weeds) should be reasonably fresh to begin with. It will in general not be advisable to use manure that is more than ten days old, unless it has been kept dry and under shelter If it shows no blackening from fermentation it may be much older. For composting the manure should be placed in ricks. The usual method is to pile down in ricks four to eight feet wide and three to five feet high and as long as may be necessary. As it is piled down in layers it should be well moistened and tramped down. It will begin to ferment immediately, and in one or two days will be quite warm below the surface. This warmth is a result of the fermentation and should continue for some time. The manure may be allowed to ferment in this way for five to eight days when small whitish spots will be observed in the hottest portions. About this time the compost should be given the *first turning.* This is most easily done by beginning at one end of the rick and forking over the entire mass into a new rick. In doing this it is necessary that the outside layers should be placed in the center of the new rick in order that all parts may become equally fermented. In forking over all lumps should be shaken to pieces, and if any parts appear somewhat dry they should be sprinkled with water. Particular attention should be given to the amount of moisture in the compost at each turning. It should be so moist that when a mass is taken in the hand and squeezed hard that just a slight amount of water will collect between the fingers. If it collects in sufficient quantity to drip from the hand it is probably a little too moist. A greater degree of moisture is undesirable, and if much less fermentation will not proceed rapidly.

In the course of a day the new rick will be quite warm and steaming as before. Allow this to continue from five to seven days, giving the pile an occasional light sprinkle to keep the surface layers from drying out excessively. By this time, probably before, the manure will have lost the usual stable odor and has a sweet smell not much unlike that of fresh mushrooms. The mass will probably be brown (not black) and greasy to the touch, the straws being easily broken but not rotten or crumbly. When the compost has reached this condition it is ready to be made into beds. Quite frequently a *second turning* is desirable. If the manure is not properly composted in a week after the first turning a second turning should be given, care

Didn't you know before that your seedman's so-and-so's "best spawn" was nothing but a "wild" spawn? Don't blame him. Nothing else was to be had until we began to produce TISSUE-CULTURE PURE SPAWN." Better tell him about it the next time he offers you just 'best spawn." Suppose we offered you "best wild apple trees?"

being taken to shake out the lumps and mix the mass as in the first turning. Repeat the test for the amount of moisture. The total time required for composting will usually be sixteen to twenty five days. During the early period the temperature inside of the compost pile will be 120 to 160 degrees Farenheit. When the temperature falls to 110 to 115 degrees Farenheit it is usually ready for making the beds.

Some growers prefer to compost the manure under the shed, but this is not necessary unless the rains are excessive. Many mix a quantity of loam with the manure, though it is of doubtless advantage. Just as good, if not better returns are secured without it. It certainly adds to the labor and expense of handling.

MAKING THE BEDS.

We quote again from the bulletin of the U. S. Dept. of Agriculture:

"Mushroom beds are of two general types, (1) the flat bed, frequenly referred to as the English, and (2) the ridge bed known as the French type. In making the former the entire floor space may be utilized as a bed, and the beds may be arranged in the form of tiers or shelves

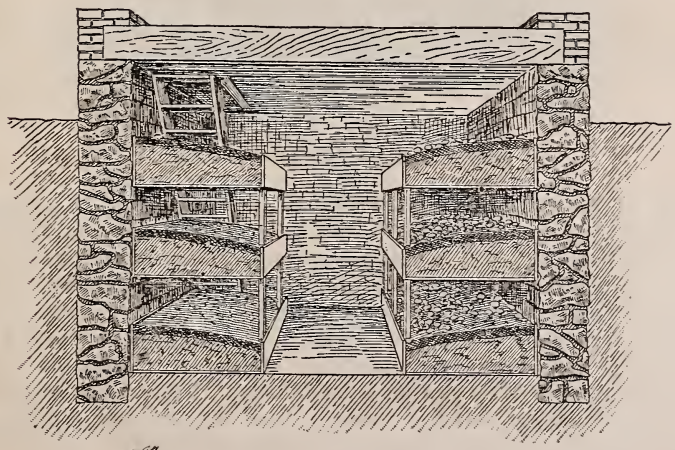

Fig. 1. Shelf beds in warm cellar.

We're here to help each other. Your interest is our interest. Don't hesitate to write us for information about GROWING MUSHROOMS. We can't expect to hold your trade unless you get BETTER results with "TISSUE-CULTURE PURE SPAWN."

as shown in figure 1. In low cellars or caves, and, indeed, wherever the amount of floor space is not the most important consideration, it would be well to avoid the use of shelves; but where the amount of floor space is an important factor they may be adopted to advantage, although the additional labor involved in the growing of a crop under such conditions is an item to be considered. When shelves are used one should be careful to whitewash these after each crop in order to

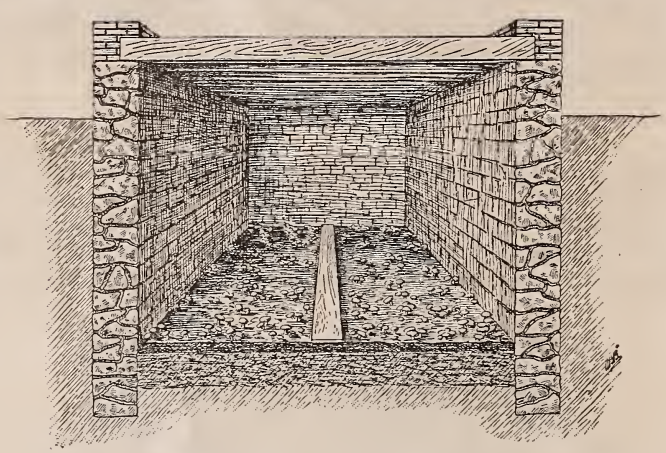

Fig. 2. Cellar with single floor bed.

avoid the incerased danger from insect depredations. In any case, flat beds (figs. 1 and 2) should be made from eight to ten inches deep.

"Ridge beds (fig. 3) enable one to get a somewhat greater surface space in a given area, but they are also more expensive so far as the labor of construction is concerned. Nevertheless, under many circumstances they are obviously desirable. They should be about 2 feet wide at the base, tapering gradually to the apex, and not more than 18 to 20 inches high when compressed and cased. The custom is to make two beds in contact, and then leave a walk way of 8 or 10 inches between the next two, and so on till the space is occupied. Next to the walls slanting beds may be prepared.

"In any case, the manure is made up in the form of the bed desired

"The Pure Culture Spawn Company (now at Meramec Highlands, Mo.) is calling the attention of mushroom growers to their new 'Tissue-Culture Pure Spawn,' grown after improved methods which are fully described in an interesting circular on the origin, history and improvement of 'Mushroom Spawns.' Pure bred spawn is an entirely new article, and its merits should be investigated by progressive growers "—American Gardening.

and should be firmed or compressed to some extent immediately, in order to prevent drying out and burning when the secondary fermentation takes place. At this time the manure should be neither wet nor

Fig. 3. Ridge beds in mushroom cave.

dry, but merely moist. The only practical test of the proper moisture content of the manure which can be relied upon is when upon compression water cannot readily be squeezed out of it.

SPAWNING.

"After the beds are prepared the temperature should be, and it usually will be be, too high for spawning. After a sudden rise the temperature should gradualy fall during the course of a week or more to about 70 or 75 degrees F. At this temperature spawning may take place, but under absolutely no circumstances should a bed be spawned at a temperature greater than 80 degrees F. If brick spawn is used, the bricks are broken into pieces about 2 inches square, or into 10 to 12 pieces per brick. These pieces are inserted from 1 to 2 inches below the surface, about 10 inches to 1 foot apart, and the bed is then compressed into final shape. Under the most favorable circumstances it is unnecessary and undesirable to water the beds for several weeks after spawning, or until they are loamed or cased. If they dry out

"No, our spawn is neither 'English' nor 'French' spawn. It is "TISSUE-CULTURE PURE SPAWN" grown direct from the tissue of select types of mushrooms. We grow it ourselves. It is not imported."

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rapidly and some water is necessary, it should be given as a surface spraying, for water in quantity applied to the young spawn will almost invariably cause the latter to damp off.

CASING THE BEDS.

"An examination of the bed about two weeks after spawning is desirable, and if it is found that the spawn is "running" the beds may be cased with loam. Casing consists in applying a layer of loam from 1 to 1½ inches deep to the surface of the bed. This loam should have been secured some time in advance and carefully worked over or screened to get rid of the largest pebbles, lumps, and trash. When applied it should be barely moist. Subsequently, if watered at all, it should be merely sprinkled in order to prevent any drying out of the bed. Neither a heavy clay nor a sandy loam should be used for casing purposes, but almost any other soil is good.

WATERING.

"As previously indicated, the spreading spawn should receive no water, or. at least. as little as possible. When, however, the mushrooms begin to appear, more water will be required, and a light sprinkling may be given once or twice each week or as often as the conditions demand. Beds which come into bearing in proper condition should never be drenched. It has been fonnd by experience that under the most favorable conditions a bed will require occasional sprinkling, since, owing to continual evaporation, there will be a gradual loss of water, at least after the mushrooms begin to appear. Sprinklings should be made after the mushrooms have been gathered, and the loam disturbed by the removal of mushrooms should always receive a light sprinkling.

PICKING AND PREPARING FOR MARKET.

"When a bed is in full bearing, the mushrooms should be gathered at least once in two days, and it is well to pick them every day, particulary if the temperature is up to 60 degrees F. or more. Picking is itself an art, and the intelligent grower will soon find that the yield of a bed may be greatly lessened by lack of judgment in picking. To satisfy the general demands of our market at the present time it is not

recomended to take the buttons; yet if there is a fancy trade for these it should be met. Little or no gain of weight occurs in the mushroom, however, after the veil begins to break, so that mushrooms should not be left after this time. Flat tops are a third-grade article, but these, as well as all defective mushrooms, should be sedulously removed from the bed every day.

"In picking, grasp the mushroom by the cap (a large one by both cap and stem) twisting it to remove it easily from the soil. Where the mushrooms come up in large united clusters, it is best to cut them, in order not to disturb the mycelial connections of all. Some good growers practice "cutting" throughout, but the stubs must decay and are a source of danger. After all good mushrooms from a cluster have been taken, remove any fleshy spawn masses adhering and add fresh loam. As they are picked, the mushrooms are put into shallow baskets and taken to a sorting and packing table. The stems are cut off and any adhering loam is brushed from the cap. It is true that mushrooms keep somewhat better if the stub is left attached and the loam removed by rubbing, but except in special cases this procedure is not to be recommended. It is not necessary to cut the stem off short, but the market demands that there be few long shanks.

"For the best trade it is desirable to "sort" the mushrooms, placing only those of nearly the same size in the same package. It is certainly not well to pack together "broilers" and buttons, if this can be avoided. Defective mushrooms should invariably be thrown out. Mushrooms should be treated as a first grade product in every way, and therefore the package must be attractive." The illustration on the front cover shows the general method. Another method is to pack the mushrooms in boxes of sizes demanded by the trade and shipping in crates. "Baskets afford excellent ventilation, yet boxes are often to be preferred. If the latter are lined with a blue paraffin or oiled paper, a good color contrast will result and the package will be made much more attractive."

Market Prices. The prices paid for mushrooms in American markets are very variable, ranging from twenty-five cents to one dollar per pound. Fifty cents may be considered an average figure. This, however, will be largely determined by the local market condition.

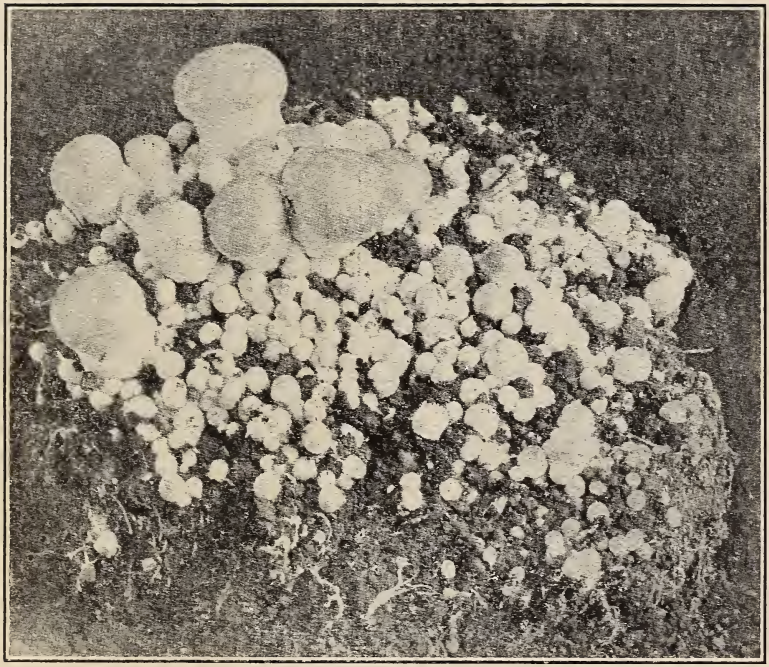
PERIOD OF PRODUCTION.

"Under favorable circumstances the bed may come into bearing within six weeks. It usually requires, however, a longer period, and eight weeks may more nearly represent the average conditions. If the

conditions have been variable, and especially if at times a very low temperature has prevailed, bearing may be still further delayed. Again, the period of production or the profitable "life" of a successful bed may vary greatly, ranging from five weeks to as many months. As a rule a bed which produces fine, heavy mushrooms will bear longer than one which yields plants of a lighter weight. Many growers think that there is profit in a bed which yields one-half pound per square foot of surface area. One should not be satisfied with less than this, and if the best conditions prevail this yield is far below what should be obtained. Two pounds per square foot is an excellent yield and some of our growers report this amount.

OLD BEDS.

When a bed has ceased to bear, or is no longer profitable commercially, it should be taken down and every particle of the bedding and casing materials removed from the cave, cellar or house. The manure is still valuable for field and garden purposes, but is wholly useless and even dangerous for mushrooms because it is not only exhausted with reference to mushroom growing but may also harbor the diseases or enemies of the mushroom. When the bed is removed the house should be thoroughly cleaned, and, if possible, sprayed or fumigated. If conditions remain constant there is no reason why another crop should not follow immediately."



Young stage of mushrooms, showing spawn, "pin-heads" and "buttons."
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